

## TITLE OF THE INVENTION

### POTENTIALLY ELASTIC INTERLACED-TEXTURED YARN AND SUEDE-LIKE ELASTIC WOVEN FABRIC PRODUCED USING THE SAME

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## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention pertains, in general, to a potentially elastic interlaced-textured yarn and an elastic woven fabric produced using the same. More particularly, the present invention relates to a potentially elastic interlaced-textured yarn produced by air-interlacing a potentially crimped filaments with a composite filaments, and an elastic woven fabric produced using the same. At this time, the potentially crimped filaments has the potential elasticity resulting from the conjugate spinning of two kinds of polymers with different thermal shrinkages, and the composite filaments is selected from the group consisting of an ultrafine filaments produced through a direct spinning process, or a sea-island type or a radial type composite filaments. Additionally, potentially elastic interlaced-textured yarns are woven, weight-reduced and subjected to a after-treatment to produce the elastic woven fabric with superior resilience, drape, elasticity, and elastic recovery.

### 2. Description of the Related Art

25 A conventional elastic woven fabric using a false twisted yarn

disclosed in Korean Pat. Laid-Open Publication No. 1994-15000 is disadvantageous in that the elasticity and elastic recovery of the conventional elastic woven fabric are poor because of a limit of the elasticity of the false twisted yarn.

5 In addition, Japanese Pat. Laid-Open Publication No. Hei. 6-212525 suggests an elastic fancy yarn which includes a polyurethane filaments (spandex) as a core yarn and a cut fiber spun yarn as an effect yarn.

However, a woven fabric produced using the above elastic fancy yarn has some disadvantages.

10 In other words, a stretching (lowering of elasticity) of the spandex occurs at a relatively high temperature ranging from 110 to 130°C during a dip dyeing process of the elastic fancy yarn, and particularly, the occurrence of the stretching is more frequent when the spandex is repeatedly dyed, causing an increase of a percent defective of the elastic 15 fancy yarn.

The stretching of the spandex is also caused by the tension repeatedly being applied to the spandex in the wearing of the spandex cloths

20 Further, a conventional filament and cut fiber composite yarn without a spandex, or a false twisted filaments, or a potentially crimped filaments has a disadvantage of the poor elasticity of a woven fabric after dyeing and finishing process, which is recited in Korean Pat. Laid-Open Publication No. 1996-14443.

Furthermore, Korean Pat. Laid-Open Publication No. 2003-0040287 25 discloses a filaments and cut fiber composite yarn with a core-sheath

structure including a potentially crimped filaments and a cut fiber spun yarn. However, this patent is disadvantageous in that it is difficult to collect the cut fibers during a ring spinning process and a twisting process is very complicated.

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#### SUMMARY OF THE INVENTION

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an aspect of the 10 present invention is to provide a potentially elastic interlaced-textured yarn which is easily produced and has superior elasticity and elastic recovery after the treatment at a high temperature during dyeing process, and a woven fabric woven using the potentially elastic interlaced-textured yarn and dyed, which has superior resilience, drape, 15 elasticity, and elastic recovery. At this time, the woven fabric secures various desired properties, for example, the woven fabric has the suede-like soft texture after a raising process, because a composite yarn constituting the woven fabric becomes extremely fined.

#### 20 BRIEF DESCRIPTION OF THE DRAWINGS

This and other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the preferred embodiments, taken in conjunction with the accompanying 25 drawing of which:

FIG. 1 is an enlarged cross-sectional view of a potentially elastic interlaced-textured yarn according to the present invention;

FIG. 2 is an enlarged cross-sectional view of a potentially crimped polyester filaments including polyethylene terephthalate and 5 polytrimethylene terephthalate used in the present invention;

FIG. 3 is an enlarged cross-sectional view of a sea-island type composite filaments used in the present invention; and

FIG. 4 is an enlarged cross-sectional view of a radial type composite filaments used in the present invention.

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#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to the present preferred embodiments of the present invention, examples of which are illustrated 15 in the accompanying drawings.

A detailed description will be given of a potentially elastic interlaced-textured yarn according to the present invention, below.

With reference to FIG. 1, the potentially elastic interlaced-textured yarn of the present invention includes a potentially crimped 20 polyester-based filaments 2 with a monofilament fineness of one to six deniers and a total fineness of 20 to 300 deniers.

The potentially elastic interlaced-textured yarn also includes a composite filaments 1 with a monofilament fineness of 0.01 to 0.5 deniers and a total fineness of 30 to 300 deniers after the composite 25 filaments is reduced in weight under an alkaline environment.

In this respect, the potentially elastic interlaced-textured yarn includes 10 to 40 wt% potentially crimped polyester-based filaments 2 based on a total weight of the potentially elastic interlaced-textured yarn, and is interlaced under air pressure of one to five kgf/cm<sup>2</sup>.

5 For example, when the total fineness of the potentially crimped filaments 2 is less than 20 deniers the elasticity of a woven fabric is poor. On the other hand, when the total fineness of the potentially crimped filaments 2 is more than 300 deniers, a combination of the potentially crimped filaments 2 and a sea island or radial type 10 composite filaments 1 is too heavy to be applied as a grey yarn of the woven fabric for cloths.

According to the present invention, the potentially crimped filaments 2 is produced by conjugate-spinning the two kinds of polymers with different thermal shrinkages in a side-by-side (refer to FIG. 2) or 15 a sheath-core manner, and physically forming a coil-shaped crimp with the use of a thermal shrinkage difference between the polymers when the polymers are heated during a spinning process or a drawing process. At this time, the potentially crimped filaments 2 has superior elasticity due to its shape, which is similar to a spring.

20 Examples of the potentially crimped filaments 2 used in the potentially elastic interlaced-textured yarn according to the present invention may include a side-by-side type composite filaments consisting of polyethylene terephthalate (hereinafter, referred to as 'PET') and polytrimethylene terephthalate (hereinafter, referred to as 'PTT') as 25 shown in FIG. 2.

The sea-island type composite filaments 1 used in the present invention is produced by conjugate-spinning or blend-spinning of two polymers, to be used to produce filaments, in a sea-island manner. In this respect, nylon-6 or PET is used as an island component 1a, and 5 copolymer polyester, polystyrene, or polyethylene, having a different solubility from the island component 1a, is used as a sea component 1b. Particularly, in the present invention, copolyester is preferably used as the sea component 1b because when polystyrene or polyethylene is used as the sea component 1b, toluene or perchloro ethylene is used as a 10 solvent. Meanwhile, the sea-island type composite filaments 1 used in the present invention is illustrated in FIG. 3, and may have any sectional shape.

Furthermore, the fineness (i.e. fineness of an insoluble component) of the sea-island type composite filaments 1 is 0.5 deniers 15 or less after it is subjected to a weight reduction treatment to be very fine, and the preferable softness, tenacity, and sense of density are secured as the fineness is lowered.

A radial type composite filaments 1' used in the present invention is produced by conjugate-spinning or blend-spinning of two 20 polymers, which are to be used to produce filaments, in a radial pattern (Refer to FIG. 4). In this regard, a fan-shaped section 1' a of the radial type composite filaments 1' is made of nylon-6 or PET, and examples of a material constituting a boundary line part 1' b of the radial type composite filaments 1' is made of copolyester, polystyrene, 25 or polyethylene which has different solubilities from the fan-shaped

section 1' a. Further, the fineness (i.e. fineness of the insoluble component) of the radial type composite filaments 1' is 0.5 deniers or less after it becomes very fine, and the preferable softness, tenacity, and sense of density are secured as the fineness becomes lowered.

5 Meanwhile, an ultrafine filaments produced according to a direct spinning process is a yarn consisting of a single component such as polyester or nylon, and has the fineness (i.e. fineness of the insoluble component) of 0.1 to 0.5 deniers. At this time, the preferable softness, tenacity, and sense of density are secured as the fineness of the 10 ultrafine filaments becomes lowered. At this time, the ultrafine filaments produced according to the direct spinning process may have any sectional shape.

15 A potentially crimped filaments content in the potentially elastic interlaced-textured yarn is preferably 11 to 67 wt% based on a weight of the sea island 1 or radial type composite filaments 1' , thereby a better potentially elastic interlaced-textured yarn is produced.

20 For example, when the potentially crimped filaments content is less than 11 wt%, the elasticity of the potentially elastic interlaced-textured yarn is poor. On the other hand, when the potentially crimped filaments content is more than 67 wt%, the protrusion of the potentially crimped filaments 2 from a surface of the potentially elastic interlaced-textured yarn starts to be prominent.

25 A condition of an air pressure during an interlacing process is determined in conformity to a kind of the selected filaments to provide the uniform interlacing property to the yarn and suppress the occurrence

of capillary. In the case of using a grey yarn comprised of a large number of filaments each having a small fineness, it is preferable that the air pressure is 2 to 3 kgf/cm<sup>2</sup>. On the other hand, in the case of using the grey yarn comprised of a small number of filaments each having 5 a large fineness, the air pressure is preferably 3 kgf/cm<sup>2</sup> or more.

A weaving process is conducted using the potentially elastic interlaced-textured yarn as the grey yarn to produce a grey fabric, and the grey fabric thusly produced is subjected to a dry heat setting process from 150 to 190°C for 20 to 60 seconds using a heater with 10 uniform heat distribution, thereby being expanded by 20 %, in comparison with the width prior to the heat treatment. At this time, an over feed ratio is 3 to 25 %. The expanded grey fabric is again subjected to the dry heat setting process at 150 to 190°C for 20 to 60 seconds to stabilize a dimension thereof, after it is subjected to a scouring, a 15 weight reducing, a contracting process, a dyeing, and a raising process in order.

When the dry heat setting process is conducted at temperatures lower than 150°C, the dimensional stability of the potentially elastic interlaced-textured yarn is poor. On the other hand, when the dry heat 20 setting process is conducted at temperatures higher than 190°C, the elasticity and texture of the potentially elastic interlaced-textured yarn are reduced.

Furthermore, when the dry heat setting process is conducted for less than 20 seconds, the dimensional stability of the potentially 25 elastic interlaced-textured yarn is poor. On the other hand, when the

dry heat setting process is conducted for more than 20 seconds, its elasticity and texture are reduced.

As described above, the woven grey fabric using the potentially elastic interlaced-textured yarn according to the present invention is 5 subjected to the above processes to form crimps on the potentially elastic interlaced-textured yarn. Thereby, the potentially elastic interlaced-textured yarn has superior elasticity of 15 to 40 %, elastic recovery of 85 % or more, resilience, and drape. Additionally, it has soft texture because of the ultrafine filaments formed by weight 10 reduction treatment of the sea-island or radial type composite filaments 1 and 1' .

The potentially crimped filaments 2 is a composite filaments including two kinds of polymers, that is, PET and PTT, as described above. In this respect, PTT has superior dyeability for dark colors at 15 a lower temperature by 20°C than PET during a dyeing process, and also has the lower modulus than PET in views of a molecular structure, thus PTT is softer than PET. Accordingly, the potentially crimped filaments 2 has superior dyeability and softness.

Having generally described this invention, a further understanding 20 can be obtained by reference to examples and comparative examples which are provided herein for purposes of illustration only and are not intended to be limiting unless otherwise specified.

Physical properties of a woven fabric produced using a potentially elastic interlaced-textured yarn according to the present invention were 25 measured as follows.

(1) Elongation and elongation recovery

The elongation of the woven fabric was measured according to a JIS L 1096 B method (static load method).

The elongation recovery of the woven fabric was measured according 5 to a JIS L 1096 B-1 method (static load method).

(2) Surface effect of the woven fabric (stretching of the woven fabric : sag phenomenon)

A sample with a size of 7.5 cm x 30 cm was secured by a clamp and 10 extended for 10 seconds in a load of 5 KG using an Ultimate Tensile strength Measuring device(UTM) according to KSK 0520 method. After 10 minutes since the load is removed, an appearance of the sample was observed to evaluate the surface effect of the woven fabric as follows:

◎: nine to ten points, ○: seven to eight points, △: five to six points, x: five or lower points (based on 10 points as a full mark)

15 (3) Elasticity after a re-dyeing process

The primarily treated woven fabric was dyed at a relatively high temperature of 130°C and in a humid environment for 30 minutes using a liquid dyeing machine, and its elasticity was measured according to a KSK 0352 5.2.2 method.

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EXAMPLE 1

One ply of PET/PTT potentially crimped filaments 2 having the monofilament fineness of 2.1 deniers and the total fineness of 75 25 deniers was interlaced with two plies of sea-island type composite

filaments 1 having the monofilament fineness before the weight reduction of 2.1 deniers, the monofilament fineness after the weight reduction of 0.04 deniers, and the total fineness of 75 deniers using an air pressure of 3 kgf/cm<sup>2</sup> in an overfeed ratio of 3 % to produce a potentially elastic 5 interlaced-textured yarn of 225 deniers.

A polyester false twisted yarn of 75 deniers as a warp and the potentially elastic interlaced-textured yarn as a weft were woven in satin weave using a Rapier loom, and then sequentially subjected to a continuous rinsing, a weight reducing, and contraction, a pre-set, a 10 dyeing, a final set, and a raising or a buffing process in order.

The elasticity and elastic recovery of the resulting woven fabric were each measured ten times according to the methods as described above, and then compared with those of a conventional spandex fabric. The results are described in Table 1.

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#### EXAMPLE 2

The procedure of Example 1 was repeated except that the polyester false twisted yarn and potentially elastic interlaced-textured yarn were 20 woven in plain weave.

#### EXAMPLE 3

The procedure of Example 1 was repeated except that PET/PTT 25 potentially crimped yarn having the monofilament fineness of 2.1 deniers

and the total fineness of 75 deniers was used as the warp.

#### EXAMPLE 4

5 One ply of PET/PTT potentially crimped yarn 2 having the monofilament fineness of 2.1 deniers and the total fineness of 75 deniers was interlaced with two plies of radial type composite filaments 1' having the monofilament fineness of 2.5 deniers and the total fineness of 90 deniers (regular PET/easily soluble PET, and the 10 monofilament fineness after a separation process was 0.3 deniers) using an air pressure of 3 kgf/cm<sup>2</sup> in an overfeed ratio of 3 % to produce a potentially elastic interlaced-textured yarn of 255 deniers.

15 A polyester false twisted yarn of 75 deniers as a warp and the potentially elastic interlaced-textured yarn as a weft were woven in satin weave using a Rapier, and then sequentially subjected to a continuous rinsing, a weight reducing and contraction, a pre-set, a dyeing, a final set, and a raising or a buffering process in order.

#### EXAMPLE 5

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The procedure of Example 1 was repeated except that the monofilament fineness of the radial type composite filaments 1' before and after the separation process were 2.5 and 0.3 deniers, respectively, and the total fineness of the radial type composite filaments 1' was 25 120 deniers.

#### EXAMPLE 6

One ply of PET/PTT potentially crimped yarn 2 having the  
5 monofilament fineness of 2.1 deniers and the total fineness of 75  
deniers was interlaced with one ply of ultrafine yarn, produced  
according to a direct spinning process, having the monofilament fineness  
of 0.32 deniers and the total fineness of 204 deniers using an air  
pressure of 3 kgf/cm<sup>2</sup> in an overfeed ratio of 3 % to produce a  
10 potentially elastic interlaced-textured yarn of 279 deniers.

A polyester false twisted yarn of 75 deniers as a warp and the  
potentially elastic interlaced-textured yarn as a weft were woven in  
satin weave using a Rapier loom, and then sequentially subjected to a  
continuous rinsing, a weight reducing and contraction, a pre-set, a  
15 dyeing, and a final set process in order.

#### EXAMPLE 7

The procedure of Example 1 was repeated except that the total  
20 fineness of the PET/PTT potentially crimped yarn 2 was 150 deniers.

#### EXAMPLE 8

One ply of PET/PTT potentially crimped yarn 2 having the  
25 monofilament fineness of 3.3 deniers and the total fineness of 30

deniers was interlaced with one ply of sea-island type composite filaments 1 having the monofilament fineness before the weight reduction of 2.1 deniers, the monofilament fineness after the weight reduction of 0.04 deniers, and the total fineness of 75 deniers using an air pressure 5 of 3 kgf/cm<sup>2</sup> in an overfeed ratio of 3 % to produce a potentially elastic interlaced-textured yarn of 105 deniers.

The potentially elastic interlaced-textured yarn as a warp and the PET/PTT potentially crimped yarn having the monofilament fineness of 2.1 deniers and the total fineness of 150 deniers as a weft were woven in 10 satin weave using a Rapier loom, and then sequentially subjected to a continuous rinsing, a weight reducing and contraction, a pre-set, a dyeing, a final set, and a raising or a buffering process in order.

#### COMPARATIVE EXAMPLE 1

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A polyester false twisted yarn of 75 deniers as a warp, and an interlaced textured yarn for med of a sea-island type composite filaments having the monofilament fineness of 2.1 deniers and the total fineness of 75 deniers and a high shrinkage filaments having the 20 monofilament fineness of 2.5 deniers and the total fineness of 30 deniers as a weft were woven in satin weave using a Rapier loom, and then sequentially subjected to a continuous rinsing, a weight reducing and contraction, a pre-set, a dyeing, a final set, and a raising or a buffering process in order.

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## COMPARATIVE EXAMPLE 2

The procedure of Example 1 was repeated except that a polyester false twisted yarn having the monofilament fineness of 2.1 deniers and 5 the total fineness of 75 deniers was used instead of the sea-island type composite filaments.

## COMPARATIVE EXAMPLE 3

10 The procedure of Example 1 was repeated except that a fancy yarn including 70 deniers spandex as a core yarn and polyester yarn of 150 deniers as a sheath yarn was used as a weft.

TABLE 1

	Ex.1	Ex.2	Ex.3	Ex.4	Ex.5	Ex.6	Ex.7	Ex.8	Co.Ex.1	Co.Ex.2	Co.Ex.3
Elongation (%)	32	27	30	34	30	34	34	35	0	29	41
Elongation recovery(%)	94	96	96	92	91	90	89	92	-	89	86
Elasticity after the re-dyeing (%)	30	26	29	32	29	31	32	33	-	28	21
Surface effect(sag phenomenon)	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	△
Appearance	◎	○	○	○	○	○	○	○	△	△	◎
Texture	◎	○	○	○	○	○	△	◎	○	△	△

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As apparent from the above description, the present invention provides a potentially elastic interlaced-textured yarn and an elastic suede-like woven fabric produced using the same. In this respect, the woven fabric produced using the potentially elastic interlaced-textured 20 yarn of the present invention has superior elasticity, and better

elastic recovery than a conventional spandex fabric, thus a stretching (sag phenomenon) rarely occurs in the woven fabric of the present invention in wearing the clothes. Additionally, the woven fabric of the present invention has superior dyeability and color fastness, and is not 5 reduced in terms of elasticity after it is dyed several times, causing a decrease of a percent defective thereof, in addition to being easily produced and securing a soft texture due to a ultrafine filaments produced through a direct spinning process, or an ultrafine sea island or radial type composite filaments constituting the woven fabric.

10 The present invention has been described in an illustrative manner, and it is to be understood that the terminology used is intended to be in the nature of description rather than of limitation. Many modifications and variations of the present invention are possible in light of the above teachings. Therefore, it is to be understood that 15 within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.